

The making of a stock assessment scientist

Early in September, Dr. Elizabeth Brooks, a 36-year-old stock assessment scientist at NOAA's Northeast Fisheries Science Center, headed out aboard the *Albatross IV* research vessel to assist with a survey of ground fish from Cape Hatteras to Cape Cod.

Her work counting and identifying various fish pulled up in the trawl net is part of her job assessing the health of cod, haddock, flounder and other fish stocks that are so vital to the communities of the Northeast.



Dr. Brooks is part of a group of 90 stock assessment scientists at NOAA who provide the science that helps the nation rebuild depleted fish species, protect threatened marine mammals and turtles and manage marine ecosystems.

Growing up in Pittsburgh, far from the sea, Dr. Brooks never imagined she would become a marine scientist. She excelled in math throughout school and was valedictorian at her high school, Penn Hills Senior High School. She went on to double major in mathematics and biology at Washington and Jefferson College just south of Pittsburgh.

She then pursued a master's and doctorate in biomathematics at North Carolina State University. As a lover of the outdoors and camping, she enjoyed applying mathematics to solve wildlife biology problems, including how best to harvest and manage wild turkeys and other land species.

"I really enjoyed the applied nature of population dynamics," she said. "It was nice to have an immediate outlet for biomathematical theory."

After completing her doctorate and graduating magna cum laude from North Carolina State University, Dr. Brooks joined the University of Miami to do postdoctoral studies at the Rosensteil School of Marine and Atmospheric Science. With one course on fisheries stock assessment under her belt, she used her quantitative skills to test models that predicted how much Gulf of Mexico snapper could be sustainably caught.

She found that her background in biomathematics could be adapted to marine stock assessments, and after the yearlong postdoc, she took a position at NOAA's Southeast Fisheries Science Center in Miami. Here she worked on assessments of sharks, swordfish and yellowfin tuna. As part of this varied work, she traveled to Spain, met with scientists from around the world and collaborated on stock assessments used for international fishing agreements. Last year, she moved north to Woods Hole, Mass., to work for NOAA's Northeast Fisheries Science Center on groundfish.

"Every stock assessment is like a puzzle," Dr. Brooks said. "You have to assemble and analyze various streams of data to determine the big picture. And you have to figure ways to work around any gaps in data."

Her work today on haddock stocks is vital to the future of fishing in the northeast and the development of effective ecosystem-based management.

“There is a great deal of opportunity to be creative in developing new models or modifying existing ones,” she said. “A stock assessment scientist does more than just estimate where the stock level is now. We also explore the future outcome of alternative management actions, and convey both the uncertainty and risk of each action.”

Dr. Brooks enjoys putting her signature on these important assessments and improving models that can better predict fluctuations in fish populations.

Although much of her work is done at a computer analyzing various sets of fisheries data, she also meets with fishermen, travels to international meetings to discuss her research and collaborate with other scientists and dons her outdoor gear each year for the trawl survey. Aboard the *Albatross IV* this month, she cut out fish earbones called otoliths, removed fish vertebra and fish scales so that these materials could be used to determine the ages of fish that are being caught. This will help scientists create a clearer picture of the demographics of various fish species.

“Working on the survey puts me in touch with the fish I’m studying and we see things here that the numbers might not reveal,” she said. “When you’re cutting open fish guts, you see who eats who.”

Dr. Brooks has also found time to follow up on research ideas generated during her stock assessments and has published articles in peer-reviewed journals. She recently worked with several other scientists on an article that tested ways to measure the abundance of adult fish that are able to spawn in species that change sex. She has also helped mentor undergraduates in the Population Dynamics Recruiting Program, a program developed by NOAA to encourage promising students to pursue careers as stock assessment scientists. She’s well aware of the shortage of stock assessment scientists and has some ideas about how to attract more young people.

“I’ve had some involvement in recent hiring attempts, and there are not a great number of quantitatively trained applicants for the stock assessment positions,” she said. “I think one way to increase that number is by broadening the search, and cross listing positions so that people with a quantitative background, but perhaps not marine focused, can still meet the educational requirements.”

“Targeting students as undergraduates is probably the appropriate time; at that age, students are still exploring majors and figuring out what they like and what kind of career it could lead to,” she said. “My involvement in the Population Dynamics workshop has been very rewarding, and I look forward to the day that some of the participants in those workshops become colleagues.”

-Profile by Monica Allen